

NOTE FOR THE RECORD**DISCUSSION AT DSG SITE RESTORATION SUB GROUP ON WEDNESDAY 3 NOVEMBER 2021 AT 1930 HRS ON DOUNREAY LOW LEVEL WASTE FACILITY: DSRL'S APPLICATION TO VARY PERMIT**

SEPA circulated documents on DSRL's application to vary the permit for the low level waste facility. This was a briefing to provide DSG with a description of the consultation process and a brief overview of the application.

The consultation process is a staged process. In this initial stage of the consultation process SEPA has identified the DSG, as a group that have an interest in SEPA's determination of the application from DSRL. As such SEPA have invited DSG to make representations to SEPA with any views on the application. This stage of the consultation will end on the 10 December 2021. The next stage of the consultation will be the wider public consultation which will start either just before Christmas or early in the new year."

The following was a discussion held on 3 November (see DSG/SRSG(2021)M03).

SEPA updated on:

- This was the culmination of a lot of work following construction of the first two LLW vaults at the new low level waste facility.
- Discussions are ongoing between DSRL, SEPA and various specialists.
- The first iteration of the permit was granted in the region of 10y years ago and the facility given permission to accept waste in 2013.
- Variation takes into account a lot of lesson learnt by DSRL and reflects changes in regulation (i.e. RSA to EASRs).
- It was the first of its kind in Scotland.
- The limits in the current EASR permit for the Low Level Waste Facility were based upon the understanding of the inventory at the time the original permit application was submitted.
- Unintended consequences in way it was expressed i.e. limits on some radionuclides which do not impact on the long term safety of the facility set too low.
- Expected there will be in the region of 18 month determination carried out by SEPA to go through proposal.
- Public consultation will be undertaken later this year and the DSG will be given opportunity to comment again when SEPA has completed its assessment, but prior to final determination of the application.

[NB: This section notes the questions and answers provided at the meeting. It also takes account of follow up comments after the meeting.]

Questions and answers**General**

Q1: Was this instigated by SEPA?

A1: No, the application for the variation has been made by DSRL.

Q2: Within the documentation there is mention of mis-consignment – can you explain?

A2: This was something that was taken to the vaults and then, as it did not meet the waste criteria, it was removed.

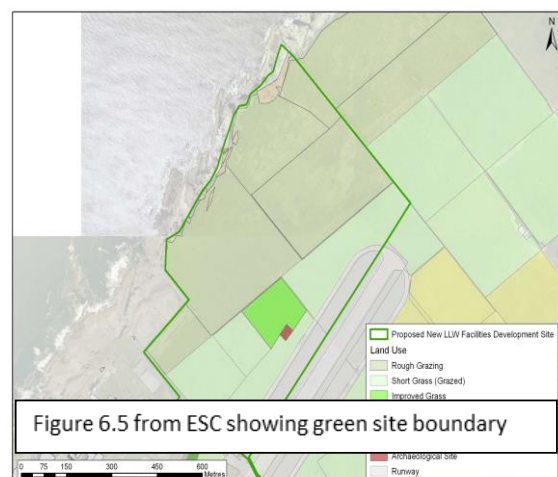
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- Q3: What appetite is there to take low level waste from outside of Dounreay?
A3: Planning permission was approved for Dounreay (and Vulcan) waste only.
- Q4: How comfortable is SEPA with the potential footprint of the vaults?
A4: Something that will be determined during the consultation. Highland Council are also consultees and therefore views will be forthcoming.
- Q5: Is this for low level waste only? It was noted that some of the debris is going into one of the vaults – does this mean the number of vaults will exceed the six that have planning?
A5: SEPA will not express a view at this point due to the process to determine the application.
- Q6: Noted there were comments on water chemistry – can you explain?
A6: DSRL baseline report is in place to cover vaults permitted area as it was first considered. This was based on the information at that time. There are monitoring requirements placed on DSRL to advance this knowledge. If monitoring identifies something untoward that will require DSRL to assess the implications and liaise with the regulator(s) dependent on what agency is regulating the site at that time.
- Q7: Does this mean a re-evaluation of the waste inventory. If so this will be a huge job and would it result in an increase in the number of vaults required?
A7: This is covered by regulation of both the Dounreay site and LLWF where permit standard conditions require optimisation and BPM (Best Practicable Means). DSRL are required to optimise the management of waste and the new application takes into account these scenarios. This is standard conditions on the disposal of waste and expectation is across all EASR permitted activities.
In terms of the inventory, this was constantly evolving and, it is believed, this will continue to evolve until closure of the site. DSRL will keep this under review taking on board decommissioning activities, new technologies, recycling, etc. Optimisation means this is kept under review.
- Q8: There is a lot of future decommissioning therefore inventory is guesswork as it is impossible to know what you will find or what volumes will be generated?
A8: The inventory is at a standard that SEPA consider, from a regulatory perspective, where it should be in the process.

Location

- Q9: Figures in the ESC 2020 D3100/4/REP/GAL/40137/IS/01 seem to suggest that the LLWF site location may be broadened. The figure below from page 127 suggests that the site may be broadening inland toward Buldoo, compared to the second image from Appendix E of the Supporting Document showing what we believe is the current boundary.

The green site boundary in the figure on the right is clearly part way across the old airstrip. The title in the figure reads “Proposed new LLW facilities development site” though this may be an old figure which has been reused.



Below Appendix E from Supporting Document D3100/4/REP/INT/40185/IS/02 showing D3100 facility boundary

The question is whether the site boundary is being considered to be revised toward Buldoo ?

If this is the case, then Buldoo residents and Caithness West Community Council should be considered as specific Stakeholder groups, and their views fully taken into account.



Waste Inventory

Q10: How does the approved inventory compare to the new proposal, especially in terms of the long-lived nuclides? Is it significantly more or less or about the same? **Is this something that can be provided?**

Q11: Is the plan to empty the on-site low level waste pits and dispose of waste in the new vaults?

A11: [NB: This will not be a material consideration in the determination of the variation.]
 DSG reps attended an optioneering workshop on the pits and also on end states. DSRL baseline is to retrieve the waste from the pits. The end state workshops are looking at the site as a whole, within this they are looking at options for the pits.
 [DSRL response: The Low level waste pits on site are in the current baseline and assumed retrieval. One of the reasons the numbers of vaults (6) was requested with planning. Currently, site is looking at options, including leaving in-situ, but this would be dependent on making the safety and environmental case.
 In terms of the inventory, it is an estimated inventory and will evolve as waste is retrieved. It will not change the inventory of the new low level waste vaults.

Q12: There will continue to be uncertainty over the radioactive waste inventory. Looking at the ESC and carried out some quick calculations there are significant quantities of uranium. If it cannot be filtered out then the case would be difficult to make in terms of in-situ given coastal erosions considerations.

A12: [David Craig (DSG) comment: To clarify for the D1212 LLW Pits, Jacobs did the initial optioneering study for the retrieving all the wastes about 10 years ago, which included costed optioneering, and the best inventory available, etc. At the time we took the latest inventory information into account - including information from retired employees. I believe

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that DSRL revisited this information in the past 2 years or so regarding potential Pits retrieval.]

Q13: Could we please see consistency in the estimated inventory for disposal, or a description/ explanation if figures vary from one part of the ESC to the other ?

In the 2020 ESC page 71 states that *“The total LLW activity, including the LLW Pits, has increased from 1.34×10^{13} Bq to 1.84×10^{13} Bq, with the alpha component doubling”*

2020 ESC page 63 considers the worst case/upper estimate for disposal (Total (Case C plus demolition) as $9.7E+12$ Bq alpha, plus $2.92E+14$ Bq “non-alpha”, giving a total upper estimate for disposal of $3.01E+14$ Bq for the facility as of 1-Jan-2020. These figures appear to be at odds.

Q14: As far as LLWF performance is concerned, **would the increased Case C plus demolition inventory impact on either short-term or long-term performance of LLWR ?** One thing not clear from the variation application and supporting documents is how much of this is down to the “sum of fractions” approach, and how much is down to a revised inventory for disposal.

Long Lived radionuclides

Q15: While there is little concern about shorter-lived nuclides, there is significant concern if the overall facility is now expected to contain significantly more longer-lived radionuclides, as this will almost certainly result in the release of very long-lived nuclides to the environment in the longer term.

“the following radionuclides have been identified as those in the predicted D3100 average fingerprint with the greatest contribution to calculated performance, and therefore reducing inventory estimate uncertainty for these nuclides will produce the greatest benefit: ^{90}Sr , ^{137}Cs , ^{226}Ra , ^{234}U , ^{235}U , ^{238}Pu , ^{239}Pu , ^{240}Pu , ^{241}Pu and ^{241}Am .” (Page 73 of the ESC)

Understanding that uncertainty on some (shorter-lived) radionuclides will impact on operational doses, and others (longer-lived) on longer-term performance, and that some of both will impact on criticality concerns. However, **it is suggested that U-238 should be added to the above list, especially given uncertainties in its inventory and its half-life.** It is believed that it is “only natural uranium” but there is rather a lot of it in the inventory and it is a very long-term alpha emitter.

To underpin these concerns regarding uranium and longer-lived nuclides:

- Regarding uranium uncertainty, 2020 ESC page 71 states *“The previous LLW Pits value was regarded to be an underestimate and has now increased significantly, from 12 kg to 462 kg uranium.”*

The key significant longer-term nuclides which we consider will outlive the LLWF facility and its design performance are tabled below. Nuclide Bq data is taken from 2020 ECS page 63 (Case C plus demolition upper estimate). I have included two longer-lived Pu nuclides for comparison, but they’re just not in the same ball park.

Nuclide	Bq (upper estimate)	Approx mass (kg)	Half-life (years)
U-235	$6.21E+10$	776	704,000,000

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U-236	2.02E+11	0.13	23,400,000
U-238	1.91E+10	1535	4,470,000,000
Pu-239 (comparison)	2.73E+12	1.2	24,100
Pu-242 (comparison)	5.27E+08	0.36	375,000

Please note that Th-232 is excluded from the list (half-life 14,100,000,000 years) as it has an extremely low specific activity and one of the most abundant elements (41st) in the earth's crust.

So from the above you can see that approx. 2.31 tonnes of uranium and ~1kg of plutonium will still be present in the wastes after coastal erosion impacts in approx. 10,000 years. In fact, long, long after that, the uranium inventory will remain radioactive. This is really not something that should be put into the LLWF unless as a last resort (and makes the safety arguments), as it will certainly impact future generations and the future environment.

This is the reason that U-238 should be added to the "improve inventory uncertainty" list of nuclides. ***It is also suggested that as far as very long-term environmental management is concerned, emphasis should be given to sort and segregate as much of it as possible, prior to consignment in the LLWF. Specifically in areas (e.g. LLW pits) where higher uranium fractions are suspected.*** This is in accordance with GRA Principles 1 and 3.

Dounreay Stakeholder Group
7 November 2021

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